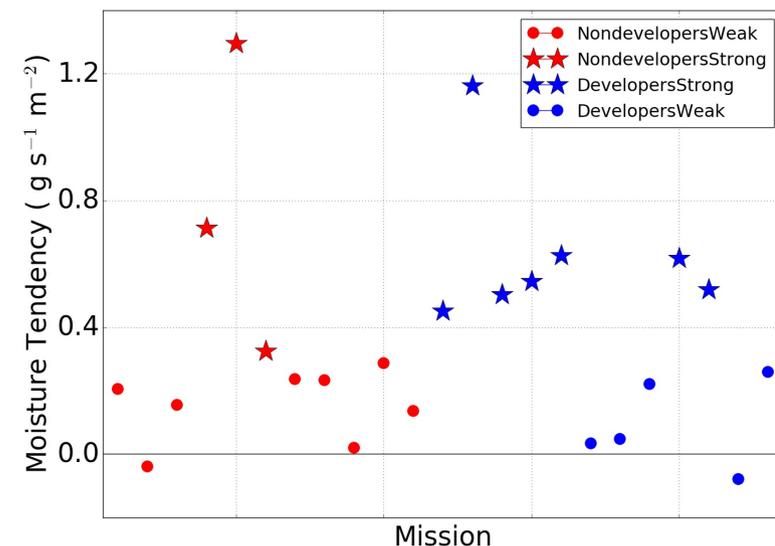
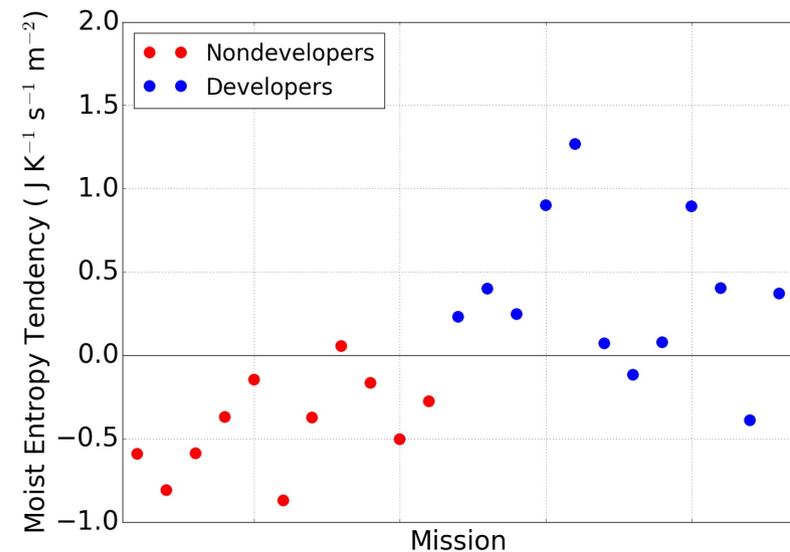


# How do moist entropy and moisture budgets relate to tropical cyclone development?

Total moist entropy and moisture tendencies, during 23 missions from HS3 and other 2 projects

- Moist entropy tends to increase during intensification
- Moisture tendency follows current tropical cyclone intensity



From Juracic and Raymond (submitted)

**Publication:** “The effects of moist entropy and moisture budgets on tropical cyclone development” by Ana Juracic and David J. Raymond. Journal of Geophysical Research - Atmospheres (submitted).

**Data sources:** Dropsonde data from the HS3 2013-2014 field campaigns. Additionally, dropsonde data from NOAA/AOML/Hurricane Research Division and TCS08 field campaign. Cloud top temperature data from MODIS instrument and SST data from NOAA/NCEI daily maps. This paper examines the thermodynamic budgets in intensifying and non-intensifying tropical cyclones. The calculations of full moist entropy and partial moisture budget (no rainfall) are done. Two storms of special interest are Hurricane Edouard (2014) and Tropical Storm Gabrielle (2013), visited multiple times during the HS3 campaign. Analysis is then extended to other HS3 cases and to data from other two projects mentioned above. The results show positive moist entropy tendency during intensification and negative tendency during non-intensifying periods. On the other hand, the moisture tendency responds more to the current strength of tropical cyclone, than its development potential.

**Technical Description of Figures:**

Top: Total moist entropy tendency (from all parts of the budget) for 23 research flights (11 are from HS3). Missions are grouped into developers (blue) and non-developers (red).

Bottom: Total moisture tendency (lateral entrainment + surface fluxes) for 23 research flights. Missions are grouped into developers (blue) and non-developers (red). Stars indicate that tropical cyclone was tropical storm or hurricane at the time of the mission. Dots represent weaker storms (below tropical storm intensity).

**Scientific significance, societal relevance, relation to future missions:** This study explores possible patterns in thermodynamic budgets, and how they relate to the tropical cyclone intensification. The results point to the moist entropy change as good indicator of development potential. This could be useful for better understanding of the mechanisms that lead to tropical cyclone intensification or decay and corresponding forecast improvements.